Name_____

Period_____

Balancing Equations and Types of Chemical Reactions

Balancing equations:

If 1 Cl looks like this: O draw the molecules symbolized here:

Cl_2 2Cl $2Cl_2$

How many atoms are in the following compounds

a) NaOH Na= 1 O= 1 H= 1

b) $Ca(OH)_2$ Ca= 1 O= 2 H= 2

c) $3Ca(OH)_2$ Ca= 3 O= 6 H= 6

The Law of conservation of matter (mass) states that matter can neither be created or destroyed

Atoms are neither created or destroyed, only rearranged in a chemical reaction

The number of a particular atom is the same on both sides of a chemical equation

Example: Magnesium + Oxygen

$Mg + O_2 \rightarrow MgO$

How many atoms are on each side:

Left: Mg = 1 O = 2

Right: Mg = 1 O = 1

If the number of atoms is not the same on both sides, we must balance the equation.

$2Mg + O_2 \rightarrow 2MgO$

Now we have a balanced equation! The matter on the left is equal to the matter on the right.

Left: Mg = 2 O = 2

Right: Mg = 2 O = 2

Cleverly, the matter on the left hand side of the reaction is called the REACTANTS and the right hand side of the equation is called the PRODUCTS

Try balancing these equations on your own:

a) $Mg + 2HCl \rightarrow MgCl_2 + H_2$

b) $3Ca + N_2 \rightarrow Ca_3N_2$

c) $NH_4NO_3 \rightarrow N_2O + 2H_2O$

d) $2BiCl_3 + 3H_2S \rightarrow Bi_2S_3 + 6HCl$

e) $C_4H_{10} + O_2 \rightarrow 4CO_2 + 5H_2O$ $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

f) $6O_2 + C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O$

g) $3NO_2 + H_2O \rightarrow 2HNO_3 + NO$

h) $Cr_2(SO_4)_3 + 6NaOH \rightarrow 2Cr(OH)_3 + 3Na_2SO_4$

i) $Al_4C_3 + 12H_2O \rightarrow 3CH_4 + 4Al(OH)_3$

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Types of reactions

A SYNTHESIS RXN is when two or more simple compounds combine to form a more complicated one.
The general form for this type of equation is A + B → AB

EXAMPLE $Na + Cl \rightarrow NaCl$

A DECOMPOSITION RXN is the opposite of a synthesis reaction - a complex molecule breaks down to make simpler ones.
The general form for this type of equation is AB → A + B

EXAMPLE $2 LiCl \rightarrow 2Li + Cl_2$

A SINGLE REPLACEMENT RXN is when one element trades places with another element in a compound.
The general form for this type of equation is AB + C → AC + B

EXAMPLE $Zn + 2 HCl \rightarrow ZnCl_2 + H_2$

A DOUBLE REPLACEMENT RXN is when the anions and cations of two different molecules switch places forming two entirely different compounds.
The general form for this type of equation is AC + DB → AD + CB

EXAMPLE $2 NaCl + MgS \rightarrow Na_2S + MgCl_2$

$N_2 + 3H_2 \rightarrow 2NH_3$

$2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$

NaBr + $AgNO_3$ → $NaNO_3$ + AgBr
Type of reaction

$CaCO_3$ → Ag_2CO_3 → $CaCO_3$ + Ag_2CO_3
Type of reaction

Mg + Fe_2O_3 → Fe + MgO
Type of reaction

$Pb(OH)_2$ → H_2SO_4 → $PbSO_4$ + H_2O
Type of reaction

NH_3 + H_2O → NH_4OH
Type of reaction

H_2O → H_2O + O_2
Type of reaction